SECTION 2 CONTENTS

EXECUTIVE SUMMARY

This section summarizes the *Jordan River Basin Plan.* Like the *State Water Plan*, this document contains 19 sections. It also has Section A, Acronyms, Abbreviations, and Definitions, and Section B, Bibliographies. In addition to its 19 sections, the *State Water Plan* contains Section 20, River Basin Summaries, and Section 21, Status Reports. The following headings are titles of each of the sections summarized. The sections should be studied for more detailed information.

2.1 Foreword

Within the broad responsibility to enhance the quality of life and general welfare of its citizens, the state of Utah has the specific obligation to plan for and encourage the best use of its resources. The *State Water Plan (1990)* provides the statewide foundation and direction. More detailed plans are and will be prepared for each of the state's 11 hydrologic basins. The *Bear River Basin Plan* was published in January 1992, the *Kanab Creek/ /Virgin River Basin Plan* was published in August 1993, the *Cedar/Beaver Basin Plan* was published in April 1995, and the *Weber River Basin Plan* was published in May 1997. This plan for the Jordan River Basin is the fifth report to be completed.

The purpose of this plan is to identify potential conservation and development projects and describe alternatives to satisfy the problems, needs and demands. Final selection of alternatives will be made at the local level.

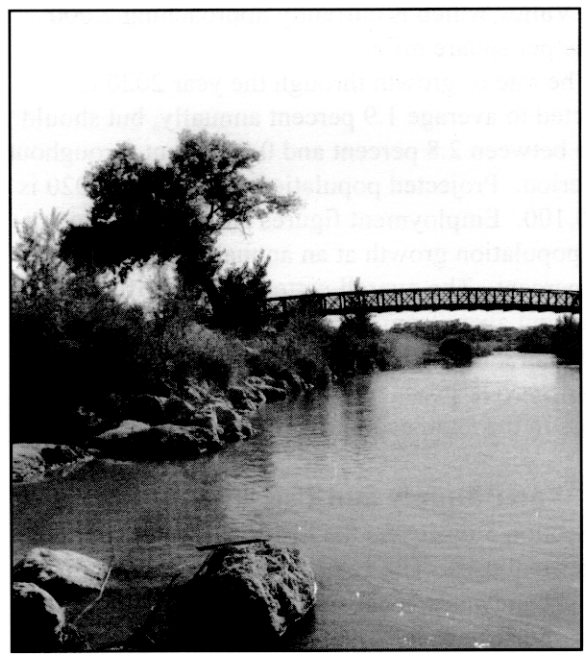
2.3 Introduction

Section 3 contains general planning guidelines used to insure continuity during plan preparation. Guidelines consist of the guiding principles, purpose, organizational structure and review process. The organizational arrangements provide contributions and review opportunities for state and federal agencies, special interest groups, and local entities, organizations and individuals. The planning process allows for review and approval of various stages of plan development. This section also discusses the settlement of the area, climate, general characteristics and land status of the Jordan River Basin.

The Jordan River is the lower portion of a larger Jordan River/Utah Lake Basin. The Jordan River conveys the outflow from Utah Lake northward some 44 miles and terminates in the Great Salt Lake. The Jordan River passes through the Salt Lake Valley draining approximately half a million acres, nearly half of which is mountainous and sparsely populated, while the remainder is a densely populated valley floor. The basin is home to just over 800,000 people, approximately 45 percent of Utah's total population.

Seasonal extreme temperatures in the valley range from -30°F in the winter to 110°F in the summer. Water surface evaporation in the valley averages 42 inches per year. The average frost-free season for the valley area is approximately 200 days from the middle of April to the end of October.

Most of the land in Salt Lake County is privately owned, especially in the the Salt Lake Valley.



Jordan River Parkway in Murray

Although Salt Lake City owns and manages 24,000 acres of the upper watershed, most of the lands in the watershed are managed by federal agencies. The biggest federal land manager is the Forest Service, which administers 91,933 acres of national forest lands in the Wasatch Range. The state of Utah has scattered land holdings of 9,778 acres. The state also owns the beds of all navigable streams and lakes. The land-use data shown reveals that residential lands are clustered primarily on the eastern and central portions of the valley. Industrial lands are fairly well scattered throughout the valley with the most significant cluster in the northwest. Agricultural use is located in the southern and southwestern portions of the valley with some irrigated acres in the northwest. Conversion of irrigated agricultural land to residential use, primarily at the southern end of the valley, is the current trend.

2.4 Demographics and Economic Future

Population, employment and the economy are discussed in this section. Salt Lake Valley, the major population and employment center in the state, is currently home to 805,000 residents. The population density for the county has grown from 900 people per square mile in 1990 to 995 people per square mile in 1995. Much of the county's rugged terrain, however, cannot be developed. Consequently it may be more appropriate to consider the population density of Salt Lake Valley which is currently approaching 2,000 people per square mile.

The rate of growth through the year 2020 is expected to average 1.9 percent annually, but should range between 2.8 percent and 0.5 percent throughout the period. Projected population for the year 2020 is 1,300,100. Employment figures are projected to outstrip population growth at an annual growth rate of 2.31 percent. The overall pattern is a significant movement away from dependence on the state's traditional goods-producing economic base and toward service-producing industries as the driving sectors in the Utah economy.

2.5 Water Supply and Use

Section 5 discusses the historical water supplies and present uses. The basin's water supply comes from groundwater, local surface water and imported water. Surface water sources include the Jordan River, Wasatch Range streams and Oquirrh Mountain streams. Imported water includes deliveries directly by pipeline from Deer Creek Reservoir, Central Utah Project (Bonneville Unit) deliveries from Jordanelle Reservoir, and Welby-Jacob Exchange water from Provo and Weber Rivers and Echo Reservoir and industrial supplies from Tooele County. On an average annual basis these sources provide 825,000 acre-feet of water, of which approximately 661,000 acre-feet has been developed for culinary, commercial, industrial, agricultural and environmental uses. However, the basin's reliable water supply (based upon 90 percent probability of availability) is 644,950 acre-feet and breaks down as follows: public drinking water systems - 333,150 acre-feet, private domestic systems - 24,600 acre-feet, self-supplied industrial systems - 39,700 acre-feet, agricultural water - 143,000 acre-feet, secondary non-potable water - 10,000 acre-feet, and developed wetlands - 94,500 acre-feet.

2.6 Management

This section describes the existing water management systems for irrigation, municipal, industrial and wetland use. Management organizations are listed and general recommendations are made. To a large extent, the flow of the Jordan River is controlled at the point of outflow from Utah Lake. For the most part, the flow regimes within the Jordan River Basin are natural. Many of the Jordan River's tributary mountain streams tend to be intermittent (and in many instances ephemeral, particularly on the west side of the valley) with flows ranging during the course of the year from zero to bank-full.

The Jordan River Basin has 10 active reservoirs, but they are relatively small and located high in the Wasatch Range. Their primary function is culinary water supply storage. Their size and location preclude their use as flood control or flow management facilities. The overall management of water in the entire Jordan River Basin is complex requiring the integration of municipal, industrial, agricultural, and recreational needs as well as fish and wildlife issues. One of the biggest problems in the Jordan River Basin is the many competing values and interested parties, with no single controlling body or agency.

Incorporated mutual irrigation companies serve the majority of irrigated land in the county. While these companies hold water rights for over 50,000 acres, recent land use surveys put existing irrigated

lands at 25,300 acres. The vast majority of drinking water supplies come from 32 approved community drinking water systems. The Jordan River Basin has an extensive system of developed wetlands which are intensively managed to promote desired waterfowl species and discourage the less desired species. Watershed management is used to protect drinking water supplies.

2.7 Regulation/Institutional Considerations

This section discusses the agencies responsible for water regulation in the Jordan River Basin. This includes consideration of water rights, water quality and environmental concerns. The two state agencies primarily responsible for the regulation of water in the Jordan River Basin are the Division of Water Rights and the Department of Environmental Quality.

The Division of Water Rights, under the direction of the State Engineer, regulates water allocation and distribution according to state water law. At the present time, the State Engineer has determined the surface water flows and groundwater in the Jordan River Basin are fully appropriated. This means the Division of Water Rights will not approve new applications to appropriate water. Because all surface water and groundwater in the Jordan River Basin are considered to be fully appropriated, the potential for new water rights appropriations is extremely limited. Applications which have been previously approved may be developed and perfected in the future. There is concern the groundwater basin has already been over-appropriated. If on-going studies confirm this, the division will undoubtedly set into effect policies and procedures designed to bring the groundwater rights into balance with the safe groundwater yield.

Water quality is regulated at the state level by the Department of Environmental Quality through two agencies, the Division of Water Quality and the Division of Drinking Water. The Drinking Water Board is responsible for assuring a safe water supply for domestic culinary uses. The board regulates any system defined as a public water supply which may be publicly or privately owned. Their standards govern bacteriologic quality, inorganic chemical quality, radiologic quality, organic quality and turbidity. Standards are also set for monitoring frequency and procedures.

2.8 Water Funding Programs

This section discusses the funding programs available. Funding can be either grants, loans at various interest rates, or matching funds. These funding resources are available for all kinds of water-related proposals. Over $157 million has been provided to the basin by state and federal agencies in the form of loans and grants in the last 50 years.

2.9 Water Planning and Development

Section 9 describes present water uses and supplies. Problems are also discussed along with future water needs, alternatives for meeting needs, and environmental, financial and economic considerations. The basin's water resources problems include water quality, meeting future municipal and industrial needs, groundwater mining, groundwater contamination, maintaining the existing infrastructure, and flooding problems. The trend of converting agricultural land to residential areas has freed up irrigation water for other uses. But the irrigation water being made available is Utah Lake and Jordan River water which is of poor quality and very expensive to treat for M & I use. Groundwater problems include concerns for groundwater quality and quantity. Both of these issues are addressed by the State Engineer through the *Salt Lake County Groundwater Management Plan.*

The Wasatch Front Water Demand/Supply Computer Model (WFCM) was used to predict the future water needs of Salt Lake County. Based upon the existing use patterns and the population growth projections provided by the Governor's Office of Planning and Budget, WFCM was used to project future water use needs at five-year intervals from years 2000 through 2020. The model predicts that over the next 25 years the demand for public water will increase an average of 1.6 percent per year. The 1995 demand for public water of 255,700 acre-feet per year will increase nearly 60 percent by the year 2020 to an annual demand of 419,300 acre-feet. The projected demands will begin to out-strip the existing supplies by the year 2010.

A number of potential water sources can be developed to meet the projected water needs, but development will be expensive. Alternatives for meeting future water needs can be classified in five basic groups:

- Develop Utah Lake/Jordan River water,
- Develop additional water from the Wasatch Range mountain streams,
- Develop additional groundwater,
- Bear River water development,
- Conservation

The potential for converting agricultural water to culinary water will be limited due to water quality concerns with Utah Lake and Jordan River water and the high cost of treatment to M&I standards.

Development of additional water from the Wasatch Range streams holds a limited potential for addressing the future needs. Plans are already in place to enlarge some of the water treatment facilities and put more of this high quality water to culinary use. Further development of these streams, however, is a very sensitive environmental issue.

Plans have been made to develop additional groundwater sources in the Salt Lake Valley, but this will be done on a very limited basis and monitored closely by the Division of Water Rights. At the present time, the State Engineer as well as many other groundwater experts believe the current level of groundwater withdrawals are approaching the safe yield levels for the valley.

The Bear River has long been viewed as an available water resource. A joint legislative/ gubernatorial Bear River task force was created in 1990 to look at water development options on the Bear River. The Bear River Task Force introduced legislation that defined the state's role in the development of the river. The 1991 Bear River Development Act states the Division of Water Resources shall construct a state project that may include the construction of reservoirs on the Bear River and a pipeline or canal to Willard Bay. Currently the Salt Lake County Water Conservancy District (SLCWCD) is purchasing land in central Weber County for a proposed water treatment plant. Also, in cooperation with the Weber Basin Water Conservancy District (WBWCD), the SLCWCD is investigating pipeline alignment alternatives to convey Bear River and/or Weber River water from the proposed plant south to Salt Lake County, This pipeline will deliver needed water to SLCWCD as well as alleviate an infrastructure problem for WBWCD in Davis County.

Potential exists to stretch existing water supplies through a number of conservation practices. Water users may be able to better manage their supplies thereby increasing efficiencies which in turn can reduce costs. This applies to all water uses including residential, commercial, industrial and agricultural. Water reuse is also a potential water conservation practice that might be employed in the near future.

2.10 Agriculture

As the Jordan River Basin population has grown, many of the agricultural areas have been converted to residential or commercial developments, significantly reducing the total irrigated acreage during the past 30 years. Historically, agriculture has been an important industry in the Jordan River Basin. Today, however, there are just over 43,800 acres of cultivated lands, of which approximately 25,300 acres are irrigated. Urbanization in the Jordan River Basin makes agriculture's role increasingly less significant in the socio-economic development of the Jordan River Basin. Still, agricultural water quantity and quality play an important role in overall water planning.

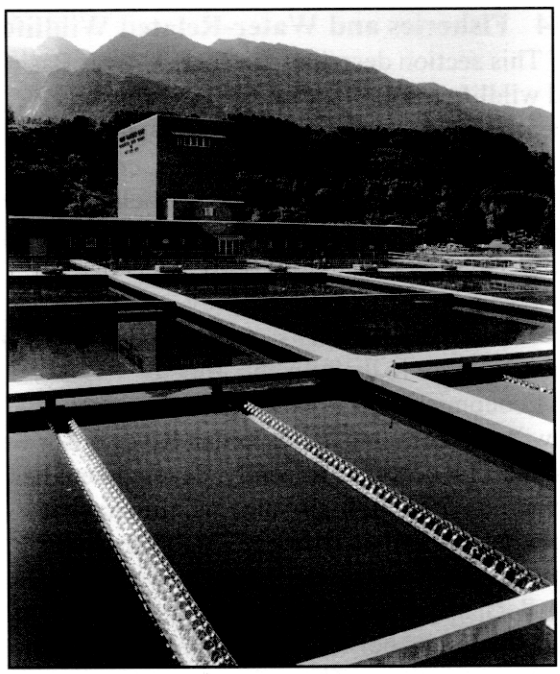
Virtually all of the surface water supplies used for agriculture come from the Jordan River. The cost of treating Jordan River/Utah Lake water to drinking water standards is currently prohibitive. Consequently, the quantity and quality of water available for agriculture is not a problem. With large tracts of formerly irrigated lands now converted to residential developments, more than enough water is available for the lands remaining in agricultural production.

2.11 Drinking Water

This section describes the present drinking water systems in the Jordan River Basin, discusses present and future problems, and presents estimated future requirements. At the present time, existing drinking water supplies are adequate and come from a rather complex mix of surface water and groundwater (including wells, springs and tunnels). Almost 99 percent of the public drinking water supplies comes from 32 approved community drinking water systems

The major water purveyors in the county are Salt Lake City, the Metropolitan Water District of Salt Lake City (MWD) and the Salt Lake County Water Conservancy District (SLCWCD). Most of the other approved water systems, despite having autonomous water sources, are dependent to some extent upon the purchase of water from one or more of these wholesalers. When planned development of current

water sources in the Jordan River Basin is completed, approximately 348,360 acre-feet of water will be available annually on a reliable basis to meet public water needs (see Table 9-2). Of this total, 125,410 acre-feet is from groundwater sources, 5,800 acre-feet from artificial groundwater recharge, 61,850 acre-feet from local mountain streams, 61,700 acre-feet from Deer Creek Reservoir, 84,000 acre-feet from CUP, and 9,600 acre-feet from the Welby/Jacob Exchange.



Little Cottonwood Water Treatment Plant, Metropolitan Water District of Salt Lake City

Salt Lake City has acquired an annual average water supply of approximately 167,000 acre-feet. This includes 61,700 acre-feet of storage in Deer Creek Reservoir controlled through the Metropolitan Water District of Salt Lake City. In addition, Salt Lake City obtains an average of 68,000 acre-feet each year from mountain streams, 20,000 acre-feet from the CUP, and 17,600 acre-feet from springs and wells and additional small quantities of water from miscellaneous sources. Salt Lake City's water supply can be characterized as "firm". The SLCWCD has a firm water supply at the present time of 98,600 to 102,800 acre-feet. In addition to the water it directly controls, the district has an agreement with the MWD (subject to availability) for an annual 10,000 acre-feet of treated Deer Creek Reservoir water. This agreement is valid through the year 2001, and may then terminate.

Water from the MWD has been sufficient in most recent years to meet Salt Lake City needs and fulfill conditional commitments to the SLCWCD, but continued growth in Salt Lake City service areas will reduce water currently delivered to SLCWCD. With this in mind, the SLCWCD has developed plans for other sources of water. The district's current supply of about 100,000 acre-feet should provide an adequate supply through the year 2010. Beyond that time SLCWCD intends to develop 25,000 acre-feet through conversion of Utah Lake irrigation water in Salt Lake County along with a major treatment plant expansion and improved treatment processes. The SLCWCD also expects to develop 50,000 acre-feet of Bear River water by the year 2015 as part of a state-sponsored Bear River project. It is anticipated that another 25,000 acre-feet of Utah Lake water will be converted to municipal use sometime after the year 2015.

2.12 Water Quality

This section presents data and information on existing levels of water quality in the Jordan River Basin. Sources of pollution are identified, problems and solutions are discussed, and recommendations for control and improvement by responsible agencies are given. The 44-mile stretch of the Jordan River from the outlet of Utah Lake to the Great Salt Lake is currently used for recreational, industrial, agricultural and wildlife purposes. The Jordan River represents a tremendous potential for even greater usage in all of these areas, as well as a potential source for domestic water, if the water quality could be improved to acceptable standards. It is generally acknowledged that water flowing from Utah Lake is of poor quality. Water quality data collected for the Jordan River, however, shows water quality continues to be degraded as the river makes its way through the Salt Lake Valley en route to the Great Salt Lake. At the present time, the basin has five wastewater treatment plants(WWTP). Four are public facilities. The fifth, privately owned and operated by Kennecott Corporation, is a self-contained facility. South Valley WWTP discharges directly to the Jordan River while Central Valley WWTP discharges to Mill Creek just above its confluence with Jordan River. The other two treatment plants, Salt Lake City WWTP and Magna WWTP, discharge almost directly into the

Great Salt Lake. Water quality studies of the Jordan River have documented high coliform counts, heavy metals and other toxic inorganic substances, depleted dissolved oxygen levels, and periodic high levels of total dissolved solids.

2.13 Disaster and Emergency Response

This section discusses flood hazard mitigation and drought response. It also briefly discusses programs now in place and additional programs that could be beneficial in dealing with flooding and drought problems. Reacting to a disaster or emergency after it has already occurred is generally inefficient, and a waste of time, money and resources. Pre-disaster activities, such as floodplain management, hazard mitigation and planning, are the preferred approaches. Many types of emergency situations are water-related, varying from disastrous flooding to extreme drought.

Because flows are regulated at the outlet from Utah Lake, flooding has not been a significant problem along the main stem of the Jordan River. Recent history, however, has given Salt Lake County residents cause for alarm along several tributaries to the Jordan River. Record snowpack and spring runoff in 1983 and 1984 resulted in numerous occurrences of local-flooding, landslides, and mud-flow problems throughout the valley, particularly along the Wasatch Front streams on the east side of the valley. Also, the rising level of the Great Salt Lake, caused by record runoff from 1983 to 1986, caused many millions of dollars in damages to Salt Lake County residents. Comprehensive Emergency Management assists the county to maintain its preparedness plans.

No single entity has sole authority for flood control management activities. Cities and counties have the necessary statutory authority to act, but at least six other state and federal agencies also have some degree of authority and responsibility. The state's emergency response and hazard mitigation coordination authority rests with CEM.

Droughts do not pose as great a threat to life and property as floods. This is primarily because existing reservoirs make it possible to provide water for essential life functions throughout the period of drought. The industry most impacted by drought is the agricultural community. In periods of extreme drought, when all users are required to cut back on water consumption, farmers can suffer significant financial losses if not total crop failure. Wildlife and waterfowl management areas adjacent to the Great Salt Lake are other water users significantly affected by drought.

Not all local governments are aware of their responsibilities as they relate to flood plain management, nor do all communities have a disaster response plan in place. Local communities should develop disaster response plans with the assistance of the Division of Comprehensive Emergency Management .

2.14 Fisheries and Water-Related Wildlife

This section describes the Jordan River Basin fish and wildlife resources, discusses existing and potential needs, and presents recommendations. Wildlife is still common along rivers, creeks, wetlands, wooded areas, abandoned fields and parks within many areas of the Jordan River Basin. It is one of the valued amenities of living along the Wasatch Front. In a recent survey, more than 95 percent of Salt Lake City residents said they enjoyed seeing wildlife in their neighborhoods.

Economic projections suggest that substantial growth will continue in the Jordan River Basin well into the 21st century. Recently, development has spread into areas of high-value wildlife habitat depleting the limited resource. Wildlife is still common along rivers and steams and in wetlands, woodlots, abandoned fields, parks and throughout residential neighborhoods within many Wasatch Front communities. Through proper planning and establishment of a system of wildlife areas throughout the basin, residents can capitalize on the unique wildlife resources and preserve the diversity of plants and wildlife. The *Jordan River Stability Study* recommends a river management plan that stresses non-structural management techniques, such as zoning restrictions and control of land use within the defined river meander corridor. Structural elements of the plan are intended to be used to enhance the natural on-going fluvial processes and reestablish a more natural channel pattern as well as protect existing development from erosion. Along with improving bank stability, erosion control and water quality, this approach should have a positive impact on fishery and wildlife habitat. Salt Lake County passed an ordinance in 1994 establishing a Jordan River Meander Corridor. The ordinance established the boundaries of the Jordan River's natural meander pattern, sets limits on the types of development and

land uses that can occur within the designated corridor, and requires developers to seek approval from Salt Lake County Flood Control. This effort follows closely on the heels of the county *Jordan River Stability Study*, published in December 1992. That study defined the Jordan River as "continually undergoing the processes of bank erosion, long-term channel bed degradation, bridge scour, sediment deposition and meander migration." In addition to reducing the flooding potential along the river, the establishment of a meander corridor should have a very positive impact upon wildlife and the environment, as the river is allowed to take a more natural sinuous course and the stream banks are allowed to stabilize.

Many of the cities that border the Jordan River (Salt Lake City, Midvale, Murray, Taylorsville, West Jordan, West Valley City, South Jordan, Riverton, and Bluffdale), are developing their own management plans for the Jordan River within their city boundaries. Many of these city plans reflect the county's efforts to establish a meander corridor and include parkways and trails. Existing wetlands and riparian habitat are being lost or impacted due to development. The Division of Wildlife Resources should identify wetlands and riparian areas with significant values to aid in their protection and preservation.

2.15 Water-Related Recreation

The purpose of this section is to describe the Jordan River Basin water-related recreational resources, identify problems and needs, and offer some recommendations. Aside from the Jordan River and the Great Salt Lake, Salt Lake County has no major lakes, rivers or reservoirs. Consequently, there are limited opportunities for recreational activities involving direct contact with water. At the north end of the county, the Great Salt Lake represents the largest recreational water attraction. Ever since the first settlers entered Salt Lake Valley, the Great Salt Lake has been a source of curiosity and a recreational attraction. Current recreational facilities on Great Salt Lake within Salt Lake County include the Great Salt Lake State Park and Saltair Resort, a privately developed facility.

Other water-related recreational activities include several privately owned and operated hunting clubs, a significant number of county- and city-owned swimming pools, as well as several privately-owned and operated water theme parks and swimming pools. Quite a few city and county parks offer picnicking and other day-use activities in the immediate proximity to ponds, small lakes and streams. The skiing industry is a major recreation activity in the Jordan River Basin that has a favorable economic impact upon the entire state.

The Utah Legislature created in 1957 what is today the Division of Parks and Recreation. Lawmakers instructed the division to develop parks and recreation areas and to preserve and protect historical sites and scenic treasures. The boating program was added in 1959 and the off-highway vehicle program started in 1971.

The major objectives for the state parks system are: 1) Provide a broad spectrum of high quality parks and recreational resources; 2) enhance the economic vitality of the state through increased tourist and vacationist traffic; 3) enforce state boating and off-highway vehicle laws; 4) regulate, protect and interpret the natural and historic resources in the park system; and 5) provide technical assistance and matching grants for outdoor recreation development.

The Division of Parks and Recreation provides matching grants for riverway and non-motorized trail enhancement. This program leverages state dollars with local dollars, requiring 50 percent local match. Since 1991, 260 requests totaling $10.2 million have been received statewide. To date, 107 projects have been awarded funds totaling $3.2 million. In the Jordan River Basin since 1991, these funds, amounting to more than $250,000, have been directed primarily at developing the Jordan River Parkway.

Within the Utah State Comprehensive Outdoor Recreation Planning (SCORP) process, surveys are conducted to determine the priority of recreational and environmental issues. The most desirable recreation activities are either water-based or water-related. Salt Lake County has passed an ordinance establishing a Jordan River Meander Corridor. The ordinance would establish the boundaries of the Jordan River's natural meander pattern, and set limits on the types of development and land uses that can occur within the designated corridor. In addition to addressing flooding concerns, water quality issues and having a positive impact upon wildlife, the creation of a meander corridor lends itself very well to the establishment of recreational facilities as one of the designated uses.

2.16 Federal Water Planning and Development

This section describes the involvement of federal agencies in Jordan River Basin water planning and development, including past and expected future involvement. In the past, federal agencies have played a big role in funding water development projects. This practice is currently in transition with federal agencies decreasing their funding for water development while increasing their regulatory responsibilities. Although the activities of federal agencies are changing, programs still are available to benefit basin residents. The primary concerns expressed by the various federal agencies in the *1990 Utah State Water Plan* are: 1) Reserved water rights, 2) interrelated planning (multiple-use planning), 3) stream and riparian habitat loss and 4) water rights filings. It is anticipated the state will be called upon to shoulder additional financial responsibilities to carry out a number of federally mandated programs. Funding these federal programs may impair the state's ability to respond to other local requests for project funding.

Federal programs most significant to the Jordan River Basin in the immediate future are: (1) The Central Utah Project (CUP) completion, under the Central Utah Project Completion Act, not only represents a culinary water source for the Wasatch Front but includes a considerable amount of environmental mitigation funding which will be used to rehabilitate streams in the Jordan River Basin; and (2) the EPA's authority under the Federal Safe Drinking Water Act and Clean Water Act. Further comprehensive federal studies in the Jordan River Basin and/or participation by the BOR, COE, or NRCS in future development would be welcomed, but they do not appear likely.

2.17 Water Conservation/Education

This section discusses water conservation needs, issues, and potential alternatives, plus gives some recommendations for conserving water. In the *State Water Plan,* water conservation is defined as "wise use," which is much wider in scope than merely reducing water consumption. State water policy on conservation presently requires project sponsors seeking financial assistance from the state to prepare a *Water Management and Conservation Plan.*

The 1992 Central Utah Project Completion Act (CUPCA) requires 39,325 acre-feet of water conservation within the project service area by the year 2007 and authorized the appropriation of $50 million. To date less than $4 million has been appropriated. This money is available on a 65-35 percentage cost share with the 65 portion being project funds.

This section includes a discussion of municipal and industrial conservation and agricultural water conservation practices. There is, however, sufficient agricultural irrigation water supply for the existing and projected demand. Also, because Jordan River water quality is poor, it is not presently economically feasible to treat it for municipal use. Consequently, no real incentive exists to conserve Jordan River irrigation water.

Conservation of municipal and industrial water is an appropriate and feasible way to meet part of the future water requirements. Numerous opportunities exist for conservation of residential water in Salt Lake Valley. Water-efficient appliances such as low flow toilets and low flow shower heads are only required in new construction. Most wholesale and retail price structuring provide little incentive for water conservation. The most inefficient use of residential water is over-watering of lawns and gardens. Education coupled with price incentives could help conserve a lot of residential water. Not as much opportunity for water conservation is in the commercial sector as in the residential. Studies do not suggest that commercial users are inefficient. A wide range of water conservation methods have been employed in various regions of the country including: wastewater reuse, public information/education, institutionalizing water conservation, restricting water use, conjunctive use, landscaping and home water savings, pricing, water measurement, and secondary or "dual" systems.

2.18 Industrial Water

This section discusses the present and future uses of water for industrial purposes in the Jordan River Basin. For this report, industrial water use is defined as water used in mining and manufacturing operations including the production of steel, chemicals, paper or any other product. It includes processing, washing and cooling operations as well as employee use. Also included, to the extent they can be identified, are such activities as gravel washing and ready-mix concrete.

No single agency or entity regulates the development or use of industrial water, although its

use must conform to existing state laws for water rights, pollution control and other regulations. The single biggest obstacle in identifying the county's total industrial water uses is that many industrial water users view their water-use data as classified information.

Industrial water use data for 1995 from the State Engineer's Office reports put the total industrial water use in the Jordan River Basin from privately held water rights at 29,700 acre-feet. The majority of the privately developed industrial water (26,500 acre-feet) comes from wells, with only 3,000 acre-feet coming from surface water, and 200 acre-feet from springs. In addition, an estimated 15,400 acre-feet of the public water supply is used for industrial purposes. Kennecott Utah Copper imports 10,000 acre-feet from Tooele county for industrial uses. That puts the basin's current industrial water use at 55,100 acre-feet. If industrial water use does grow at the same rate as the population over the next 25 years, demand will increase from 51,400 acre-feet to over 82,000 acre-feet in 2020.

2.19 Groundwater

This section describes groundwater conditions in the Jordan River Basin. Currently, groundwater provides approximately 168,500 acre-feet annually or 26 percent of the presently developed water supply for municipal, industrial, irrigation, domestic and stock-watering purposes. Groundwater in the valley's principal aquifer is generally of excellent quality on the east side of the valley, with the quality becoming poorer on the west side and towards the Great Salt Lake. The water quality of the shallow unconfined aquifer is generally poor. There is an upward gradient from the principal aquifer to the shallow aquifer over a large percentage of the valley. This helps maintain the high quality of the principal aquifer. Evidence indicates, however, that excessive pumping from the principal aquifer can reverse the upward gradient, allowing downward leakage of the poor quality water.

The *Salt Lake Valley Interim Groundwater Management Plan* was created to provide the necessary management guidelines until the USGS groundwater study is completed and incorporated into the groundwater regulations. One of the biggest concerns at the present time is the total volume of groundwater withdrawals. It is in the best interest of all water users that the groundwater not be mined. Groundwater mining can potentially result in the contamination of the principal aquifer by inducing inflow of poorer quality water.

Present groundwater withdrawals of 168,500 acre-feet are believed to be very close to the average annual yield of the principal aquifer. If unperfected water rights claims are developed, the total groundwater withdrawals would exceed 387,500 acre-feet, considerably higher than the estimated average annual recharge of the principal aquifer. Part of the U.S. Geological Survey groundwater study will provide more complete data and information about the affects of withdrawals on the water quality of the aquifer. The study will be used to establish the groundwater management plan for years to come.

Groundwater contamination can be a very serious problem with potentially long-term consequences. Throughout Salt Lake Valley, many differing types of toxic materials are stored directly on the ground or underground in containment structures. Unreported spills can go undetected for a considerable time while the contamination spreads throughout the aquifer resulting in a time consuming and expensive cleanup.

Two such spills which have been addressed in recent years are the contamination by leachate from uranium-mill tailings, and contamination of the Bingham Canyon and Bingham Creek area by seepage from reservoirs and evaporation ponds associated with mining activities. ■